

Name \_\_\_\_\_

KEY (Path 2/3)

Period \_\_\_\_\_

## Chemistry: What to Study Guide

Know how to:

- Find the number of protons, electrons, and neutrons in an element using the periodic table of elements.
- Determine the number of valence electrons in an element.
- Draw Bohr models and Lewis Structures (dots) for different elements.
- Determine the number of protons, electrons, and neutrons in an ion or an isotope.
- Determine whether two elements will create ionic, covalent, or metallic bonds.
- Draw Lewis Structures showing how electrons are transferred to show an ionic bond.
- Draw Lewis Structures showing how electrons are shared to show a covalent bond.
- Know how to read and interpret a phase change diagram
- Know how to identify examples of solutions, suspensions, compounds
- Know how to identify more and less dense objects

**\*Also be sure to know all the vocabulary words and answers below\***

Vocabulary words: Define each.

- Atom – smallest particle of an element that still has all the properties of that element
- Atomic Mass – the bottom number on the periodic table; the total number of protons plus neutrons in an atom
- Atomic Number – the top number on the periodic table; the number of protons in an atom
- Boiling – change from liquid to gas
- Compound – two or more elements chemically joined together
- Condensation – change from gas to liquid
- Covalent Bond – a chemical bond in which 2 nonmetals share electrons
- Decomposition – a reaction where one complex compound breaks apart into two simple compounds

- Density – mass per unit volume
- Dissolve – spread evenly throughout another substance
- Double Bond – when two pairs of electrons are shared in a covalent bond
- Double Replacement (Displacement) – a chemical reaction where two elements switch partners
- Electron – a small, negatively charged particle found in the electron cloud
- Electron Cloud – the area around the nucleus of an atom where electrons are found
- Element – substance that cannot be broken down chemically into simpler substances and is made of only one type of atom
- Fluid – a substance in which the molecules are able to flow past each other; liquids and gases are fluids
- Freezing – change from a liquid to a solid
- Gas – a state of matter that has neither a definite shape nor a definite volume
- Heterogeneous – a mixture that does not mix together evenly
- Homogeneous – a mixture that mixes together evenly
- Ion – a charged particle formed when an atom gains or loses one or more electrons
- Ionic Bond – type of bond that forms when electrons are transferred from one atom to another
- Isotope – atoms of the same element that have different number of neutrons
- Lewis Structure – a model of the atom that shows only valence electrons which are shown in pairs around the element symbol
- Liquid – state of matter that has a definite volume but not a definite shape

- Melting – change from solid to liquid
- Metallic Bond – bond in which a network of positively charged metal ions surrounded by a sea of negatively charged electrons
- Mixture – two or more substances that are mixed together but are not chemically combined
- Neutron – particle with no charge that is part of the nucleus of the atom
- Noble Gas – unreactive element in Group 18; it already has a full outer shell of electrons
- Nucleus – central part of an atom that is made of protons and neutrons
- Periodic Table – table in which the elements are arranged in order of increasing atomic number
- Proton – particle with a positive charge that is part of the nucleus of the atom
- Single Bond – when one pair of electrons is shared in a covalent bond
- Single Replacement (Displacement) – a chemical reaction in which one element replaces another element in a compound
- Solid – state of matter that has a definite shape and a definite volume
- Solute – substance that dissolves in a solvent to form a solution
- Solution – homogeneous mixture in which particles of one substance are spread evenly throughout the other substance
- Solvent – substance in which a solute dissolves to form a solution
- Subatomic – smaller than an atom (parts of an atom)
- Suspension – heterogeneous mixture in which particles of a substance are temporarily mixed in a liquid
- Synthesis – a chemical reaction in which two simple compounds come together to make one complex compound

- Valence Electron – electron in a atom's outermost shell or energy level
- Vaporization – change from liquid to gas

Answer the following questions:

- How is an ion different from the basic element?

An ion has gained or lost electrons. It has a different number of electrons than protons. It has a charge.

- How is an isotope different from the basic element?

An isotope has a different atomic mass and a different number of neutrons.

- What happens if we change the number of protons in the element?

It is no longer the same element.

- Why do we not include the number of electrons in the atomic mass?

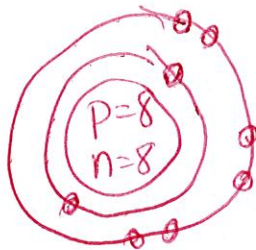
Electrons are much smaller than protons and neutrons, so their mass is very tiny so we do not count it in the total atomic mass.

Use your periodic table to determine:

1. How many protons does a Carbon atom have? 6
2. How many neutrons does a Calcium atom have? 20
3. How many electrons does a Helium atom have? 2
4. How many valence electrons does Argon have? 18
5. How many electrons does oxygen want to gain to form an ion? 2
6. How many electrons in O-18? 8
7. How many neutrons in O-18? 10

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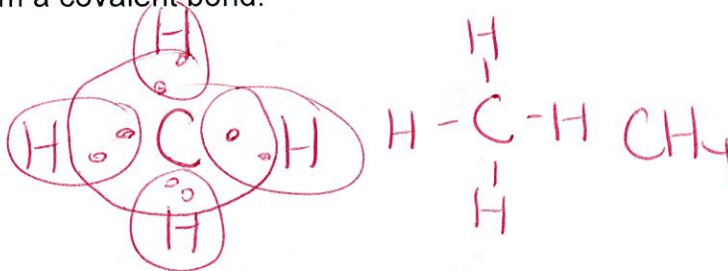
8. How many protons in O-18? 8
9. If the charge of the ion is "plus 3" did we gain or lose electrons? lost
10. Metals and nonmetals create ionic bonds.
11. Metals and metals create metallic bonds.
12. Two nonmetals will create covalent bonds.
13. Will nitrogen form a cation or an anion? anion
14. Draw a Bohr Model for Oxygen.



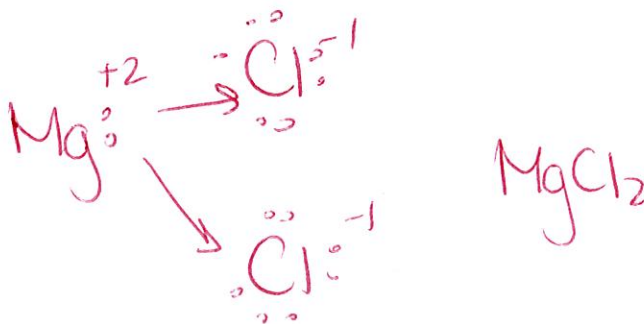
15. Draw a Lewis Structure for Magnesium.



16. Draw the Lewis structures to show how Carbon and Hydrogen will share electrons to form a covalent bond.



17. Draw the Lewis structure to show how Magnesium and Chlorine will transfer electrons to form an ionic bond.



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18. Name two examples of solutions.

Salt water, sugar water, Kool-Aid, chocolate milk

19. Name two examples of suspensions.

Sand and water, pepper and oil

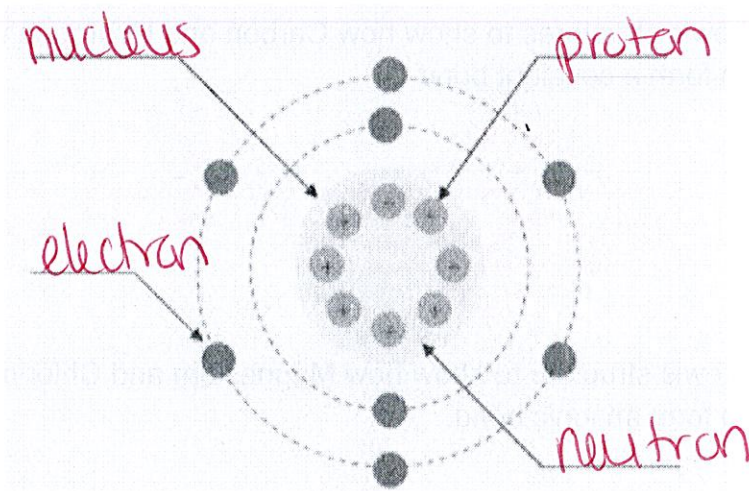
20. Name two other heterogeneous mixtures.

Fruit salad, trail mix

21. Explain the difference between a heterogeneous and a homogeneous mixture.

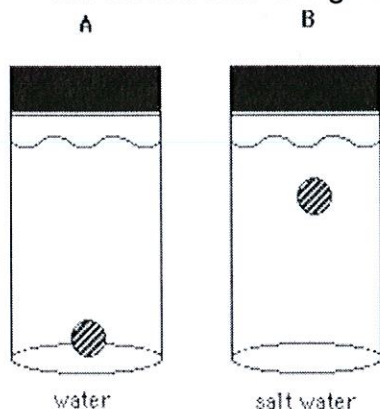
A heterogeneous mixture is not evenly mixed. A homogeneous mixture is evenly mixed.

22. Label the protons, electrons, neutrons, and nucleus in the atom below:





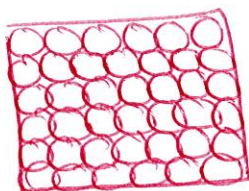
23. Which has a higher density, salt water or water? How do you know?



Salt water,  
because the ball  
floats higher in  
salt water

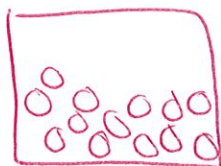
24. Draw examples of the particles in a solid, liquid, and gas. Explain what the particles are doing in each picture you draw. Label each picture.

Solid



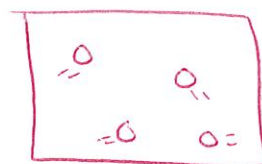
- vibrating
- fixed structure
- definite shape + volume

liquid



- flow
- definite volume
- no definite shape

gas

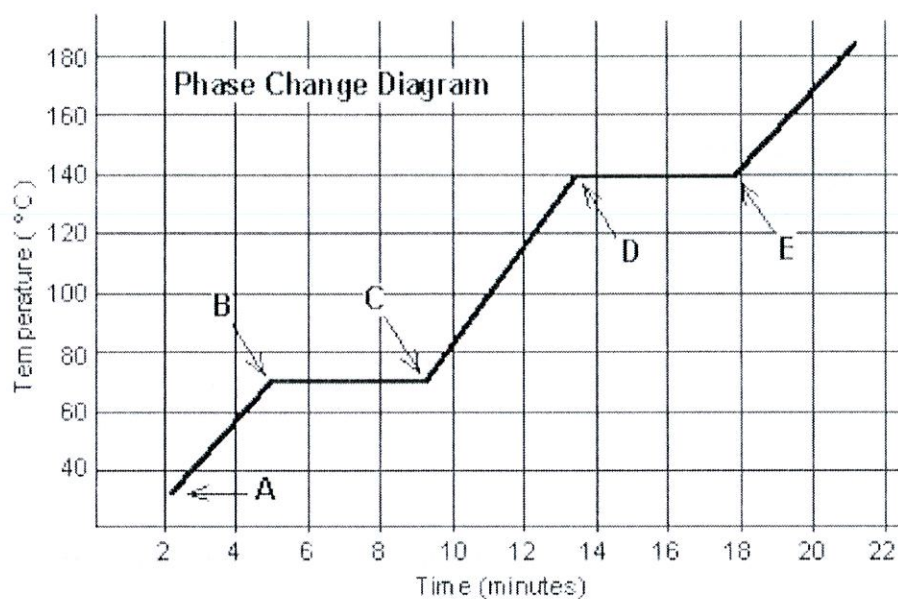


- fast moving
- spread to fill entire container

25. Explain how you can tell if a chemical reaction has occurred? (MIND MAP)

- change in smell
- fizzing
- gas is produced
- sound is produced
- heat is produced

Use the phase change diagram below to answer the remaining questions:



1. What is the boiling point of this substance? 140°C
2. What is the state of matter at 60 degrees Celsius? solid
3. Between what two letters do we find only liquids? CD
4. Between what two letters do we find freezing? BC
5. Why do we find solids and liquids at the same time on BC?  
It is in the process of changing

The answer to each question below is either ionic, covalent, or metallic.

1. In a(n) covalent bond, electrons are shared between two atoms.
2. In a(n) ionic bond, electrons are transferred from one atom to another.
3. In a(n) metallic bond, there is a sea of electrons shared by all the atoms.
4. A(n) covalent compound has a low melting point.
5. A(n) metallic compound is able to conduct electricity.



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6. A(n) ionic compound can dissolve in water.



Name \_\_\_\_\_

Period \_\_\_\_\_

More Ions ~~Homework~~

Element	Valence Electrons	Gains/Loses How many?	Charge	Cation/Anion
Lithium	1	lose 1	+1	cation
Potassium	1	lose 1	+1	cation
Chlorine	7	gain 1	-1	anion
Cobalt (II)	2	lose 2	+2	cation
Copper (I)	1	lose 1	+1	cation
Polonium	6	gain 2	-2	anion
Sulfur	6	gain 2	-2	anion
Phosphorus	5	gain 3	-3	anion
Francium	1	lose 1	+1	cation
Calcium	2	lose 2	+2	cation
Nitrogen	5	gain 3	-3	anion
Bromine	7	gain 1	-1	anion
Silver (III)	3	lose 3	+3	cation
Selenium	6	gain 2	-2	anion

And some isotopes:

## Carbon - 14

Atomic mass: 14Atomic number: 6Protons: 6Electrons: 6Neutrons: 8

## Iodine - 60

Atomic mass: 60Atomic number: 53Protons: 53Electrons: 53Neutrons: 7

